

TMDL Decision Document

TMDL: June 1, 2006 Minnesota Statewide Mercury Total Maximum Daily Load

Status: Final

Date of U.S. EPA Decision: March 27, 2007

Impairment/Pollutant: Approximately two-thirds of the waters on Minnesota's 2006 303(d) list are identified as being impaired for mercury due to fish tissue concentration of mercury and/or water column exceedance of the mercury water quality standard. To address these widespread mercury impairments Minnesota divided the State into two regions, a northeast region and a southwest region, and established a total maximum daily load (TMDL) for each region. Collectively, the two regional TMDLs address 511 mercury impairments throughout the State that were identified in Category 5 of Minnesota's 2006 Integrated Report. Each TMDL includes daily loads for the loading capacity, wasteload allocation (WLA), load allocation (LA), plus a margin of safety (MOS). The target for both TMDLs is 0.2 milligrams of total mercury per kilogram of fish, or parts per million (mg/kg or ppm) fish tissue mercury concentration, which is a surrogate for the numeric water column water quality standards: 1.3 nanograms per liter (ng/L) for the Lake Superior Basin, and 6.9 ng/L for the rest of the State.

Background: The Minnesota Pollution Control Agency (MPCA) provided a preliminary TMDL Report to U.S. EPA in October 2004. MPCA released to the public a preliminary TMDL Report on the State's website in December 2004. U.S. EPA sent the State comments on the preliminary Reports in January 2005, and MPCA responded to these comments in March 2005. MPCA provided the public notice draft TMDLs to U.S. EPA in May 2005. A public notice and comment period was held from July 18, 2005 to October 18, 2005. The State presented the final regional TMDLs to the MPCA Citizens' Board for approval to submit the TMDLs to U.S. EPA on July 25, 2006. The Citizens' Board unanimously approved submitting the final regional TMDLs to U.S. EPA for review and approval. On August 30, 2006, U.S. EPA received a final TMDL Report dated June 1, 2006 (TMDL Report). The TMDL Report included copies of public comments received by the State, an index of comments received and issues raised, a responsiveness summary, and a log of public participation and supporting documents. On August 30, 2006, under separate cover, U.S. EPA received a transcript of the July 25, 2006 Citizens' Board meeting.

Conclusion: After a full and complete review of the TMDL Report and supporting documents, U.S. EPA finds that pursuant to Section 303(d) of the Clean Water Act, 33 U.S.C. Section 1313(D), and U.S. EPA's implementing regulations at 40 CFR Part 130, the northeast and southwest regional mercury TMDLs satisfy the elements of approvable TMDLs. This approval addresses a total of 511 lake and river reach impairments as identified in Category 5 of Minnesota's 2006 Integrated Report. A load allocation for both TMDLs has been established. The primary nonpoint source identified in both TMDLs is atmospheric deposition. One wasteload allocation has been established for each region. Point sources, including stormwater, municipal wastewater treatment facilities, and industrial dischargers, that impact the impaired lakes and river reaches addressed by these TMDLs are subject to the applicable regional wasteload allocation. An explicit margin of safety has been established for the southwest region's TMDL while an implicit margin of safety has been used for the northeast region's TMDL. The final approved TMDLs are included in Section 9 of the TMDL

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Report and are as follows:

Table 1: Approved Northeast and Southwest Mercury TMDLs

Region	Loading Capacity	Load Allocation	Wasteload Allocation	Margin of Safety
Northeast	1.10 kg/day	1.09 kg/day	0.01 kg/day	Implicit
Southwest	2.18 kg/day	1.55 kg/day	0.02 kg/day	0.61 kg/day

U.S. EPA's approval of the mercury TMDLs extends to the water bodies which are identified on Table 2 to this Decision Document and in Appendix A to the TMDL Report, with the exception of any portions of the water bodies that are within Indian Country, as defined in 18 U.S.C. Section 1151. U.S. EPA is taking no action to approve or disapprove the State's mercury TMDLs with respect to those portions of the waters at this time. U.S. EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under Section 303(d) for those waters.

U.S. EPA REVIEW OF THE ELEMENTS OF NORTHEAST AND SOUTHWEST TMDLs

Section 303(d) of the Clean Water Act (CWA) and U.S. EPA's implementing regulations at 40 CFR Part 130 describe the statutory and regulatory requirements for approvable TMDLs. Additional information is generally necessary for U.S. EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) of the CWA and U.S. EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term "should" below denotes information that is generally necessary for U.S. EPA to determine if a submitted TMDL is approvable.

1. Identification of Water body, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the water body as it appears on the State's/Tribe's 303(d) list, the pollutant for which the TMDL is being established, and the priority ranking of the water body. The TMDL submittal should include an identification of the point and nonpoint sources of the pollutant of concern, including location of the source(s) and the quantity of the loading, e.g., lbs/per day. The TMDL should provide the identification numbers of the NPDES permits within the water body. Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of the natural background. This information is necessary for U.S. EPA's review of the load and wasteload allocations, which are required by regulation.

The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as: (1) the assumed distribution of land use (e.g., urban, forested, agriculture); (2) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources; (3) present

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*and future growth trends, if taken into consideration in preparing the TMDL; and (4) an explanation and analytical basis for expressing the TMDL through surrogate measures, if applicable. Surrogate measures are parameters such as percent fines and turbidity for sediment impairments; chlorophyll *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.*

Identification of Water Bodies:

The lakes and river reaches identified in Category 5 of Minnesota's 2006 Integrated Report are impaired due to high mercury water column concentrations and fish tissue mercury concentrations that result in a recommended consumption frequency of less than one meal per week for any member of the population. Over the past several reporting cycles, Minnesota's Integrated Reports have included a footnote stating that the mercury impairments are considered regional and a regional or statewide TMDL would be developed to address the mercury impairments. After consideration of available fish tissue data, water quality data, and land cover and use information the State has established two regional TMDLs, for a northeast region and a southwest region, that will address mercury impairments in lakes and river reaches within the State.

Section 4 of the TMDL Report discusses the State's determination that major factors contributing to variations in fish tissue mercury concentration are land cover and use. Land cover and use affects the transport of mercury through a watershed. Nutrient loadings and water chemistry also influence the bioavailability of mercury within a watershed. The State considered the bioavailability of mercury in wetlands and forested lands versus cultivated lands when determining the two regions. The TMDL for the northeast region includes the Northern Lakes and Forest ecoregion and the Northern Minnesota Wetlands ecoregion, which are dominated by forest and wetlands. The other ecoregions within the State are included in the TMDL for the southwest region and are mainly cultivated lands. Respectively, Figure 2 and Table 2 of the TMDL Report show the two regions and regional differences in land cover and some water quality differences.

Both the northeast and southwest TMDLs were established to address impairments in some of the lakes and river reaches within each region. Table 2 of this Decision Document identifies the lakes and river reaches and corresponding mercury impairment for each water body being addressed by the northeast and southwest TMDLs.¹ The TMDL Report is titled "Statewide TMDL" which could imply that the TMDLs address all mercury impairments in the State or all the mercury impairments identified on Category 5 of Minnesota's 2006 Integrated Report. The northeast and southwest TMDLs, however, do not address all mercury impairments. The northeast and southwest TMDLs address 511 of the lakes and river reach impairments identified on Category 5 of Minnesota's 2006 Integrated Report.

In response to public comments received during the public notice and comment period, Minnesota decided to remove a group of lakes and river reaches from the TMDLs. The public comments

¹ Appendix A of the TMDL Report identifies the lakes and river reaches and corresponding mercury impairment for each water body being addressed by the northeast and southwest TMDLs.

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raised concern that not all water bodies included in the public notice draft TMDLs would meet water quality standards. A reduction factor, necessary to achieve the target fish tissue mercury concentration in the standard size top predator fish, was calculated by the State for each of the two regions. The reduction factors for both regions were calculated using the TMDL target fish tissue mercury concentration of 0.2 mg/kg and the 90th percentile fish tissue mercury concentrations in the standard size top predator fish. A mercury fish tissue concentration of 0.572 mg/kg was the highest concentration used in calculating the regional reduction factors. Public comments raised concern that if fish tissue concentrations in a water body exceed 0.572 mg/kg the water body would not meet water quality standards and therefore, public comments recommended removing water bodies from the TMDLs that had fish tissue concentrations higher than 0.572 mg/kg. In response to these public comments Minnesota decided to re-assess the water bodies included in Appendix A of the public notice draft TMDL Report and remove water bodies that had a maximum mercury concentration for a fish size class mean greater than 0.572 mg/kg. The water bodies that were removed from Appendix A of the draft public notice TMDL Report and are currently included in Category 5 of Minnesota's 2006 Integrated Report, will remain in Category 5 until such time as these water bodies are meeting water quality standards, a TMDL has been completed and approved, or some other appropriate reason for removing these waters from Category 5 is available.

Pollutant of Concern:

The pollutant of concern is mercury. Mercury is a multimedia global pollutant. Mercury is emitted to the air, transported then deposited to the soil and beds of rivers, lakes and streams, where a number of biological and chemical processes occur in the soils, water bodies, and sediments that cause mercury to react with organic materials to form methylmercury, a highly toxic form of mercury. Methylmercury builds up, or bioaccumulates, in the bodies of animals, so fish at the top of the aquatic food chain are likely to contain higher mercury concentrations than fish lower in the aquatic food chain. Humans and wildlife are exposed to unsafe levels of methylmercury by eating contaminated fish.

Sources of Pollutant Loads:

Sources considered by the State in the development of the northeast and southwest TMDLs include atmospheric mercury deposition, WWTPs, non-municipal waste discharges, and stormwater. For these TMDLs the only significant nonpoint source identified by the State is atmospheric deposition of mercury. The State identifies 99% of the total mercury load as coming from atmospheric deposition. Both natural and anthropogenic sources contribute to the atmospheric deposition mercury load. The TMDL Report identifies natural sources as contributing 30% to the atmospheric deposition mercury load while the remaining 70% is from worldwide anthropogenic sources. These TMDLs do not address natural contributions of mercury.

Specific point sources that the State considered as sources contributing to the mercury load in the impaired water bodies are identified in Appendix B to the TMDL Report and in the State's responses to public comments.² These sources include discharges from WWTPs, pulp and paper

² Pages 17-18 of Minnesota's Responses to Mercury TMDL Issues

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mills, taconite mines, coal-fired power plants, and one refinery. The public notice draft TMDL did not include the coal-fired power plants and the refinery. These point sources were added by the State in response to public comments received during the public notice and comment period.

For the purpose of describing the sources of pollutant loads and estimating the 1990 total source load, the State included the mercury loadings from stormwater in the estimate of loadings from atmospheric deposition. Using data generated in two studies of snowmelt runoff from agriculture fields and data generated in a pilot study for the Minneapolis-St. Paul NPDES municipal stormwater permit,³ the State determined that the source of mercury to stormwater is atmospheric deposition and that there are no other significant anthropogenic sources of mercury to stormwater.

Priority Ranking:

Minnesota has consistently included mercury impaired waters on its 303(d) lists. Minnesota's 303(d) lists have also included a footnote stating that mercury impairments are mainly regional so a regional or statewide approach to developing mercury TMDLs is appropriate. Section 303(d)(1)(A) of the Clean Water Act requires States to establish a priority ranking for the impaired waters, taking into account the severity of the pollution and the designated uses of the impaired waters. The target schedule on Minnesota's 303(d) list reflects the State's priority ranking. In establishing the priority ranking, i.e., the target schedule for developing TMDLs, the State considers factors such as the severity of the pollutant, available monitoring data and targeted monitoring schedule, designated use of the water body, and available resources. The State scheduled most of the impaired water bodies addressed by these TMDLs for development starting in 1999 and completion expected by 2011.

Future Growth

Although Section 6.5 of the TMDL Report contains a discussion of reserve capacity, the TMDLs do not contain a specific allocation that is reserved for future growth. The State's discussion states that the TMDLs provide a reserve capacity, load that is available for future growth when actual loads are less than the allocations, for point sources but not for nonpoint sources. The TMDL Report continues on to say that since the actual nonpoint source loads are in excess of the load allocations there is no reserve capacity for nonpoint sources. The TMDL Report also states that there is reserve capacity for point sources because the actual mercury load from point sources is less than the wasteload allocation. Although the TMDL report contains statements that actual loads are in excess or below the specific load and wasteload allocations, this does not mean that there is a specific allocation to address present and future growth trends in the development of these TMDLs. Any future growth of point or nonpoint sources will need to be consistent with the applicable regional load and wasteload allocations of these TMDLs and the assumptions that were used in development of these TMDLs. The State did not provide specific load or wasteload allocations for future growth nor did the State include specific mercury loads from anticipated future growth in its calculation of the total source loads used to develop these TMDLs.

³ See April 25, 2005 electronic mail message from Bruce Monson, MPCA, to Julianne Socha, U.S. EPA.

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Key Assumption Made in the Development of the TMDLs:

The State assumed that the mercury levels in fish would be reduced in proportion to the reductions in mercury deposition, based on the following rationale:⁴

- a. A reduction in emissions from sources in a given source area (local, regional or global) results in a proportional reduction in the rate of deposition in Minnesota attributable to those sources.
- b. A reduction in deposition results in a proportional reduction in mercury loading to water bodies.
- c. Within a given water body, a proportional reduction in mercury loading in the water results in a proportional reduction in mercury concentrations in fish.

Minnesota relies on the results of two models from the U.S. EPA Mercury Maps report,⁵ the Mercury Cycling Model and the IEM-2M Watershed Model, which found linear relationships between atmospheric deposition and fish tissue mercury concentrations in support of the State's assumption of proportionality. Starting with the relationship presented in the Mercury Maps report and applying some simplifying assumptions, Minnesota derived a relationship between a baseline deposition value, a target fish tissue concentration, and a baseline fish tissue concentration (see equation 5 on page 25 of TMDL Report). In deriving this equation some of the simplifying assumptions applied by Minnesota included that the area of land and water remain constant over time, bioavailability factor and runoff coefficient are constant over time,⁶ and that there are no natural sources of mercury within the State. The methodology used by the State to establish the northeast and southwest TMDLs, i.e., using a fish tissue mercury concentration reduction factor to establish the loading capacities, relies on this principle of proportionality.

Assessment: U.S. EPA finds that the Mercury TMDLs submitted by the State of Minnesota adequately describe the water bodies, pollutant of concern, pollutant sources, and priority ranking. U.S. EPA finds that the State's consideration of fish tissue data, water chemistry data, and land cover and use information support the establishment of regional TMDLs. U.S. EPA finds that the State's assumption of proportionality is consistent with U.S. EPA study results and the State's use of this assumption in the establishment of the TMDLs is reasonable.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the water body, the applicable numeric or narrative water quality criterion, and the antidegradation policy. (40 CFR §130.7(c)(1)).

⁴ The rationale is an excerpt from Section 5.2 of the TMDL Report.

⁵ Cocca P., *Mercury Maps, A Quantitative Spatial Link Between Air Deposition and Fish Tissue*, September 2001, EPA-823-R-01-009.

⁶ The bioavailability factor accounts for the fraction of divalent mercury converted to methylmercury, which is available for bioaccumulation. The runoff coefficient is a discount applied to the watershed mercury loading to account for mercury that is buried in the soil or volatilized to the atmosphere.

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U.S. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

The TMDL submittal must identify a numeric water quality target(s) – a quantitative value used to measure whether or not the applicable water quality standard is attained. Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. The TMDL expresses the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target. Occasionally, the pollutant of concern is different from the pollutant that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as Dissolved Oxygen (DO) criteria). In such cases, the TMDL submittal should explain the linkage between the pollutant of concern and the chosen numeric water quality target.

Numeric and Narrative Mercury Standards:

Section 3 of the TMDL Report describes the applicable Minnesota water quality standards. Minnesota's numeric mercury water quality standards are based on total (particulate + dissolved) mercury concentrations in the water column. Minnesota has two Class 2 standards, 6.9 ng/L and 1.3 ng/L as set forth at Minnesota Rules Chapter 7050.0222 and 7052.0100. Both of the numeric standards are a chronic standard. The 1.3 ng/L is a wildlife-based standard applicable to only the waters of the Lake Superior Basin, and the 6.9 ng/L standard is a human health-based standard and applies to waters outside of the Lake Superior Basin. In addition to the numeric standards, the State's narrative standard at Minnesota Rule Chapter 7050.0150, Subpart 7, provides the basis for assessing the contaminants in fish tissue. The narrative standard states that a water body shall be considered impaired when the Minnesota Department of Health recommends a consumption frequency of less than one meal per week for any member of the population.

Linking Fish Tissue Concentrations to Standards:

Minnesota selected a water quality target of 0.2 mg/kg fish tissue mercury concentration in both the southwest and northeast TMDLs. The 0.2 mg/kg target is lower than the recommended criteria as set forth in U.S. EPA's methylmercury criterion of 2001,⁷ which established a fish tissue criterion of 0.3 mg/kg. U.S. EPA's criterion considers toxicity and exposure. Minnesota's proposed 0.2 mg/kg relies on U.S. EPA's toxicity assumptions and values. Minnesota assumes a higher exposure rate than U.S. EPA's rate. Minnesota assumes an exposure rate of 30 grams of fish per day compared to U.S. EPA's assumption of 17.5 grams per day for the general population in the United States. Minnesota uses a higher exposure rate because of the importance of sport fishing in Minnesota and based on surveys of the fish eating habits of upper Midwest anglers. In Section 4.4.3 of the TMDL Report the State demonstrates a linkage between the fish tissue mercury concentration target and the existing numeric water quality standards. Since Minnesota's standards are water column chronic standards for total mercury, and not fish tissue concentration standards, the State needed to include a link from the fish tissue target to the numeric water column

⁷Office of Science and Technology, Office of Water, U.S. Environmental Protection Agency, *Water Quality Criterion for the Protection of Human Health: Methylmercury*, January 2001, EPA-823-R-01-001.

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water quality standards. The State used bioaccumulation factors for 14 lakes representing agricultural areas, urban areas, and forested areas in the northeast to calculate the water column concentration that would be equivalent to the 0.2 mg/kg fish tissue target. The water column concentrations, calculated using bioaccumulation factors, are well below the State's numeric water quality standards. Thus the State has successfully demonstrated that the water quality standards will be met when the fish tissue mercury concentration target is achieved.

Proposed Numeric Standard:

Minnesota is proposing to add a numeric fish tissue water quality standard to Minnesota Rules Chapter 7050. This proposed numeric fish tissue water quality standard is a quantification of the existing narrative standard set forth in Chapter 7050. The proposed standard is 0.2 mg/kg and will apply to total mercury concentrations in edible fish tissue of any species of fish from Minnesota's waters. The proposed fish tissue water quality standard will augment, but will not replace or change the current water column numeric chronic standards.

Assessment: U.S. EPA finds that the TMDL Report submitted by the State of Minnesota adequately describes its water quality standards, relevant criteria, and water quality target. U.S. EPA agrees that a fish tissue mercury concentration is an appropriate water quality target for these TMDLs. Minnesota's selection of a fish tissue target is linked to the State's numeric and narrative water quality standards, is consistent with U.S. EPA criterion, and it is a logical target since fish consumption is the primary exposure pathway of methylmercury to humans and wildlife. U.S. EPA also notes that the approach is consistent with Minnesota's proposed plan to adopt a fish tissue water quality standard.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a water body for the applicable pollutant. U.S. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 CFR §130.2(f)). The TMDL submittal should describe the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model. The TMDL submittal should contain documentation supporting the TMDL analysis, including the basis for any assumptions; a discussion of strengths and weaknesses in the analytical process; and results from any water quality modeling. U.S. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

TMDLs must take into account critical conditions for stream flow, loading, and water quality parameters as part of the analysis of loading capacity. (40 CFR §130.7(c)(1)). TMDLs should define applicable critical conditions and describe their approach to estimating both point and nonpoint source loadings under such critical conditions. In particular, the TMDL should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

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The loading capacity for the northeast TMDL is 1.10 kg/day, and the loading capacity for the southwest TMDL is 2.18 kg/day.

Overview of TMDL Methodology

The loading capacities established by the State for each region were calculated by multiplying a regional reduction factor⁸ needed to achieve the fish tissue mercury concentration target by a baseline load⁹ for each region, thus calculating a regional load reduction goal.¹⁰ The load reduction goal was subtracted from a baseline load to arrive at the loading capacities. For each region the State calculated the baseline load as the sum of the point source load and nonpoint source load for the year 1990. In the TMDL Report the State refers to the baseline load as the total source load (TSL). The reduction factor for each region was derived by assessing existing fish tissue mercury concentration data, then determining the reduction needed to achieve the fish tissue concentration target of 0.2 mg/kg.

1990 Baseline

The State's TMDL Report and response to comments provides three primary justifications for calculating the TSL for 1990. First, the TSL is the sum of the point source load and the nonpoint source load. The nonpoint source load is represented by total (wet and dry) mercury deposition. Minnesota's estimate of both wet and dry deposition is from lake sediment cores collected in a study conducted from 1988 to 1990.¹¹ Minnesota's use of 1990 for the TSL, therefore, is reasonable because the State had a significant number of sediment core samples over a broad geographic area upon which to base the loading estimates. The second justification the State provided for the 1990 TSL is to remain consistent with other mercury reduction baselines. The State uses 1990 as its mercury emission inventory baseline, and other State and Federal plans such as the Great Lakes Binational Toxics Strategy and the Lake Superior Lakewide Management Plan use 1990 as a baseline for assessing mercury reductions. Thus, the State selected a baseline year that was consistent with other reduction goals and targets. The third justification provided by the State for the 1990 TSL is that mercury use was relatively high and dropped precipitously beginning around 1990 as mercury was removed from many products. For this reason 1990 represents the end of a period when mercury emissions and fish tissue concentrations were in a steady state. The studies and figures discussed in Section 5.3 of the TMDL Report support the assumption that decreases in the United States' mercury product use and mercury emissions occurred around 1990. The impact of these decreases in mercury use on fish tissue mercury concentrations is yet to be fully realized; therefore, Minnesota selected 1990 for the baseline year.

⁸ The northeast regional reduction factor is 65%. The southwest regional reduction factor is 51%. Section 4.4 of the TMDL Report sets forth how the State derived these reduction factors.

⁹ The baseline load for the northeast region is 1153 kg/yr and the baseline load for the southwest region is 1628 kg/yr. Section 6 of the TMDL Report describes how the State established the baseline load, which is referred to in the TMDL Report as the total source load (TSL).

¹⁰ The load reduction goal for the northeast region is 749 kg/yr and 830 kg/yr for the southwest region. These load reduction goals are found in Table 8 of the TMDL Report.

¹¹ Swain, E.B., D.R. Engstrom, M.E. Brigham, T.A. Henning, and P.L. Brezonik. 1992. *Increasing rates of atmospheric mercury deposition in midcontinental North America*. Science 257: 784-787.

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Total Source Load for 1990

The sum of the point source load and nonpoint source load are the TSL for each region. The TSL for each region simply defines the baseline load for the region to which the applicable reduction factor is applied. Section 6 of the TMDL Report provides the State's calculation of the TSL.

- **Point Source Load Portion of the 1990 TSL**

The point source portion of the TSL was calculated for each region. Within the southwest region point sources used in the point source load calculation included water discharges from wastewater treatment facilities, one refinery, and energy facilities. Within the northeast region the State considered water discharges from wastewater treatment facilities, taconite mines, energy facilities, and pulp and paper mills.

The State used current design flows from NPDES permits (refer to Appendix B of the TMDL Report for specific NPDES permits and design flows), and effluent mercury concentrations to calculate the point source load portion of the TSL. If actual effluent mercury concentrations from WWTPs were available the mean effluent concentrations were used, as was the case for the Metro Waste Water Treatment Plant in the southwest region and the Western Lake Superior Sanitary District in the northeast region. For all other WWTPs, the State used a mercury concentration of 5 ng/L, which the State refers to as "typical". This "typical" concentration was chosen based on a study by the Association of Metropolitan Sewerage Agencies that reported a median effluent concentration value of 5 ng/L.¹² Minnesota also cites in the TMDL Report a State study of 37 NPDES facilities where the central tendency of mercury concentrations in effluent were in the range of 4 to 6 ng/L as support for the "typical" mercury concentration of 5 ng/L.

For taconite mines the State relied on the State's discharge monitoring database for effluent data from which the concentration of 1.5 ng/L was derived. For pulp & paper mills the State relied on the Mercury Maps report for the average effluent concentration of 13 ng/L.¹³ According to the TMDL Report average effluent mercury concentrations from Wisconsin paper mills are 2 ng/L and average effluent concentrations at Minnesota's Boise Cascade facility are 1.6 ng/L. Remaining consistent with approaches used and information contained in the Mercury Maps report, Minnesota elected to use the effluent concentration reported in the Mercury Maps report for pulp and paper mills rather than the facility specific average effluent concentrations. In the public notice draft TMDLs, the point source load portion of the TSL did not include discharges from energy facilities or the refinery. In response to the public comments received during the public notice and comment period the State recalculated the point source load portion of the TSL to include discharges from energy facilities and the refinery.¹⁴

- **Nonpoint Source Load Portion of the 1990 TSL**

The nonpoint source load portion of the TSL was determined for each region using the total mercury deposition of $12.5 \text{ g km}^{-2} \text{ yr}^{-1}$ and the regional surface areas of $129,674 \text{ km}^2$ for the

¹² Page 12-13 of the Mercury Maps report

¹³ Page 12 of the Mercury Maps report

¹⁴ Page 17-18 of Minnesota's Responses to Mercury TMDL Issues

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southwest region and 90,151 km² for the northeast region. Minnesota's estimate of total mercury deposition is based on sediment cores from Minnesota lakes. Minnesota's estimate includes both wet and dry deposition. The nonpoint source load portion is the product of total mercury atmospheric deposition and regional area. As previously discussed in section 1 of this Decision Document, the nonpoint source load portion of the TSL accounts for contributions from stormwater.

In calculating the portion of the TSL resulting from atmospheric deposition, the State assumed that 100% of all atmospheric mercury loads, over time, reach a water body. Public comments raised concern that this assumption of 100% delivery ratio, i.e., 100% of the mercury deposited on land is delivered to water bodies, skews the relationship between point source and nonpoint source loads. Public comments pointed out that the TMDL Report, Section 5.2, identifies the composite runoff coefficient for Minnesota in the range of 0.28, i.e., 28%, of the mercury deposited on land will be delivered to water bodies. Public comments also pointed out that the Mercury Maps report on page 18 states that 20% of air deposited mercury will reach water bodies on a long-term average annual rate. The State responded that the 28% coefficient reported for Minnesota comes from a study of relatively undisturbed headwater lakes and does not represent delivery ratios in watersheds disturbed by agriculture, urban development, or forestry. The State's response also reported that a study for large Chesapeake Bay tributaries reported delivery ratios ranging from 6.9% to 85.4%. The State suggested that true delivery factors probably vary from less than 10% to more than 90% with the potential of 100%. Given this variability in delivery ratios and given that the mercury concentration in fish tissue is largely determined by the mercury loading to the watershed, and that mercury loading to the watershed is largely impacted by the atmospheric mercury loads the State chose not to change their original assumption of the 100% delivery ratio.

U.S. EPA finds the State's response acceptable. The State has identified the primary source of mercury impairments as resulting from atmospheric deposition and provided a rationale for its use of a 100% delivery ratio. In addition, the State explained that its use of a 100% delivery ratio was related to the State's calculation of the wasteload allocation, as further discussed in section 4 of this Decision Document.

Reduction Factor

The reduction factor is the percent reduction in total mercury load needed to achieve the fish tissue target of 0.2 mg/kg for the 90th percentile of the standard length fish. Fish tissue data were reviewed for the standard size top predator fish in each region. The 90th percentile fish tissue mercury concentration and median concentrations were calculated for each region for top predator fish, i.e., walleye and northern pike. Using the difference between the 90th percentile mercury concentration in top predator fish within each region and the 0.2 mg/kg target, the State calculated reduction factors of 65% for the northeast region and 51% for the southwest region.

The 90th percentile was selected as the appropriate statistic because the State believes it is consistent with the U.S. EPA's human health water quality criteria guidance.¹⁵ U.S. EPA's guidance states

¹⁵ Office of Science and Technology, Office of Water, U.S. Environmental Protection Agency, *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. October 2000. EPA-822-B-00-004.

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that water quality criteria are derived to protect the general population and that U.S. EPA uses a combination of median values, mean values, and percentile estimates to calculate the national criteria. The guidance also states that the assumptions are believed to be protective of the overall population and appropriate to meet the goals of the CWA.

The reduction factor was established using fish tissue data from 1988 to 1992. The State looked at fish tissue data from 1970 to 2002; however, to be consistent with the baseline year of 1990, fish tissue data from 1988 to 1992 were selected. Multi-year data better represent real conditions over time because they account for year-to-year variability in weather, fish populations, and sampling locations.

Data for the standard size top predator fish were used to calculate the reduction factor. Mercury bioaccumulates in fish; therefore mercury concentrations are typically highest in the top predator fish. Walleye and northern pike were selected as the top predator fish for both regions by Minnesota. The TMDL Report states that if the fish tissue target concentration is met in the top predator fish, then it is likely to be met in other species and the water column because the top predator fish have the highest mercury concentrations. Section 4.4.3 of the TMDL Report and previous discussion in this Decision Document explains how the State has demonstrated that when the fish tissue target concentration is met the water column standard will also be met.

To account for temporal and spatial comparisons of mercury concentrations in the top predator fish the standard size top predator fish is used. Minnesota uses a standard size of 40 cm (approximately 22 inches) for walleye and 55 cm (approximately 16 inches) for northern pike. Top predator fish that are collected for fish tissue analysis vary in size and age. Since mercury concentrations vary with the size of fish and age of fish, it is difficult to make comparisons regarding mercury concentrations in fish without establishing a standard of comparison. Use of the standard size fish accounts for differences in mercury concentrations due to age and size and enables the State to compare mercury concentrations across water bodies. Section 4.4 of the TMDL Report explains the linear regression procedure for predicting the mercury concentration in a standard size fish. The linear regression procedure used by the State provides a method of using a set of fish tissue data from a water body rather than just a single sample point. Use of a set of fish tissue data, rather than data from a single fish, lends itself better to protection of the general fish population.

Public comments received during the public notice and comment period raised concern that water quality standards would not be met because the load reduction goals were based on the standard size top predator fish. Public comments also raised concern that the 90th percentile was used as the assessment endpoint for determining necessary reductions. In response to these comments the State provided a more detailed discussion of how the standard size is determined and how the 90th percentile is appropriate for addressing the regional impacts of the mercury impairments. The explanation in Section 4.4 of the TMDL Report shows that the standard size top predator fish falls within the highest frequency size class for the species when compared to the Department of Health's fish consumption advisory fish size classes. Falling within the highest frequency size class means that the standard lengths are representative of the most common class size. In the response

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to comments the State provides further explanation of its use of the 90th percentile and why it is consistent with U.S. EPA guidance. In assessing the appropriateness of the State's use of the standard size top predator fish and the 90th percentile, U.S. EPA considered not only the State's response to public comments and the TMDL Report, but also several other sources of information: 1) the Minnesota Department of Health's Statewide Safe Eating Guidelines which recommend that the most sensitive population not eat walleye larger than 20 inches or northern pike larger than 30 inches; 2) the Minnesota Department of Natural Resources fishing regulations which provide catch and release requirements for many larger class sizes of fish on various lakes in Minnesota; and 3) U.S. EPA's own guidance for deriving ambient water quality criteria.

Critical Conditions

The regulations at 40 CFR §130.7(c) require TMDLs to take into account critical conditions as part of the analysis of the loading capacity. The State's position on critical conditions in the TMDL Report and its response to comments is very brief. The position taken by the State is that the usual factors that are considered critical in TMDL development are not relevant to mercury in fish because bioaccumulation happens gradually over time and is influenced by various factors. The critical condition identified by the State is that some water bodies are more sensitive to mercury loading because of the water body's chemistry. The State believes the regional approach to the development of the TMDLs already accounts for the sensitivity of the receiving water bodies.

Public comments pointed out some other critical conditions such as temperature, soil type, erosion, dissolved organic matter, length of the food chain, and sulfates. Although each of these suggested critical conditions were not responded to explicitly by the State, the State's regional approach does take into account many of the conditions that may impact the mercury load to a water body. Sections 4.1 and 4.2 of the TMDL Report discuss numerous factors including water quality differences, land cover and use differences, the influence of sulfates, methylmercury associated with dissolved organic carbon, and influence of nutrient-enriched lakes in support of the regional approach. In the TMDLs, the water bodies are grouped into two regions based on differences in a number of these factors. Thus, although the regional approach may not address every potential critical condition that could impact mercury load to a water body the regional approach does consider many of these conditions.

Assessment: U.S. EPA finds that the Mercury TMDLs submitted by the State of Minnesota adequately identify the loading capacity and adequately account for critical conditions. Minnesota's methodology of defining a TSL, then applying a reduction factor to arrive at the loading capacities, is an acceptable approach. Minnesota's use of sediment cores, study data, and actual facility discharge data to establish 1990 as the baseline and define the baseline TSL is acceptable. Minnesota's effort to define a steady state condition that takes into consideration the key assumption of proportionality is also acceptable. U.S. EPA finds the State's approach to developing the reduction factors reasonable after considering the State's method for determining the standard size fish. U.S. EPA also considered consistencies between how the reduction factors were determined and Department of Health guidelines and U.S. EPA guidance. U.S. EPA also finds that the State's regional approach adequately addresses the critical condition of differences in water

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bodies' sensitivity to mercury loadings.

4. Wasteload Allocations (WLAs)

U.S. EPA regulations require that a TMDL include wasteload allocations, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 CFR §130.2(h), 40 CFR §130.2(i)). In preparing the wasteload allocations, it is not necessary that each individual point source be assigned a portion of the allocation of pollutant loading capacity. When the source is a minor discharger of the pollutant of concern or if the source is contained within an aggregated general permit, an aggregated wasteload allocation can be assigned to the group of dischargers.

The wasteload allocation is 0.01 kg/day for the northeast region and 0.02 kg/day for the southwest region. Consistent with its regional approach, Minnesota did not assign wasteload allocations to individual point sources; rather the State has established a gross wasteload allocation for each region. In addition to the wasteload allocation for the northeast region, the TMDL Report states that all wastewater discharges in the Lake Superior Basin will remain subject to the 1.3 ng/L water quality standard for mercury as set forth in the Minnesota Rules, Chapter 7052.

The State assigned 1% of the TMDL to point sources as the wasteload allocation for each regional TMDL. The State chose 1% of the TMDL based on an approach used in the Mercury Maps report to screen watersheds for significant point source impacts in order to identify water bodies impaired primarily by atmospheric mercury. The northeast region wasteload allocation was set at 1% of the loading capacity while the southwest region's allocation was set equal to the point source load portion of the TSL. The State set the southwest region's wasteload allocation equal to the point source load portion of the TSL because it was slightly less than 1% of the southwest region's loading capacity and the State chose the more restrictive allocation.

Assessment: U.S. EPA finds that the wasteload allocations are adequately specified in the TMDLs at a level sufficient, when combined with the load allocation, to attain and maintain water quality standards. U.S. EPA agrees that Minnesota's water quality standards applicable to wastewater discharges in the Lake Superior Basin apply in addition to the northeast wasteload allocation.

The State explained that its choice of 1% of the TMDL was related to its assumption that 100% of atmospheric mercury loads, over time, reach a water body, as discussed in the Loading Capacity section of this Decision Document.¹⁶ In deciding on a significance level of 1% of 100% of atmospheric mercury loads, the State considered the approach used in the Mercury Maps report. The State noted that, using the approach in Mercury Maps, the assumption would be that 20% of the atmospheric mercury loads would reach a water body. The Mercury Maps report identifies watersheds where air deposition is the predominant mercury source by screening for watersheds that are considered to have a significant contribution from point sources or other sources. Watersheds

¹⁶ See, for example, pages 13-15 of Minnesota's Responses to Mercury TMDL Issues

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are considered to have a significant point source contribution if the sum of mercury loads from the publicly owned treatment works (POTWs) within the watershed is greater than 5% of the air deposited load as delivered to the water bodies. Since Minnesota assumes a delivery ratio of 100% rather than 20%, the State chose to use 1% of the air deposited load rather than 5% of the 20% of the delivered load as used in the Mercury Maps report. Mathematically, 5% of 20% of the air deposited load is the same as 1% of 100% of the air deposited load.

In selecting a regional approach to the development of these TMDLs, the State considered air deposition as the primary source of mercury loadings. Consistent with the regional approach, Minnesota did not assign wasteload allocations to individual point sources, rather the State established one wasteload allocation for each region. U.S. EPA agrees that these wasteload allocations are reasonable in light of the significant contribution of mercury from air deposition, which as described in Section 5.1 of the TMDL Report, is approximately uniform across the State, and the relatively small contribution of other sources of mercury. The sum of the loads from existing, new, or expanded point sources (municipal WWTPs, non-municipal dischargers, and stormwater) within a region must not exceed the regional wasteload allocation. U.S. EPA notes that at the time a permit is issued or renewed for a point source the permitting authority will need to assure that the permit is consistent with the assumptions and conditions that went into development of these wasteload allocations. In addition, pursuant to Federal regulations at 40 CFR 122.4(i), no permit may be issued to a new source or a new discharger if the discharge will cause or contribute to the violation of water quality standards. For this reason, it would not be appropriate for the State to issue NPDES permits to new sources or discharges of mercury if it will cause or contribute to the violation of the mercury fish tissue or water column standards. The State recognizes in the TMDL Report that, at the time of permit issuance, the State should ensure that the specific point source discharge will not cause or contribute to an exceedance of the gross wasteload allocation for the region. To do this, the permitting authority must evaluate whether the point source discharge will cause or contribute to a localized exceedance of the water quality standard and determine permit limits accordingly.

Appendix B to the TMDL Report identifies specific point sources that the State considers subject to the wasteload allocations. In addition to the point sources identified in Appendix B, NPDES permitted stormwater sources are subject to these wasteload allocations for the region in which they are located. Therefore, NPDES stormwater permits in the southwest region will be issued consistent with the 0.02 kg/day wasteload allocation, and NPDES stormwater permits in the northeast will be issued consistent with the 0.01 kg/day wasteload allocation. The permitting authority will have to ensure that stormwater permits are issued consistent with these regional wasteload allocations. As described previously in the Decision Document, the State did not include the mercury loadings from any specific stormwater sources in the calculation of the total point source load; rather, for purposes of determining the TSL, loadings from stormwater were included in the estimate of contributions from atmospheric deposition. The State determined that the contribution of mercury from stormwater sources other than atmospheric deposition as zero and on a regional scale this is reasonable. However, in addition to ensuring that the regional wasteload allocation is not exceeded, the permitting authority must also evaluate whether there are local

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stormwater discharges that will cause or contribute to a localized exceedance of the water quality standard and determine permit limits accordingly.

The wasteload allocations were established as a percentage of the loading capacity or equal to the point source load portion of the TSL. Both the loading capacity and point source loads were calculated by considering the design flows of NPDES permits within each region, and for most facilities, the State used a typical effluent mercury concentrations based on studies. When permits are issued the permitting authority should take into consideration the design flow and effluent mercury concentrations set forth in Appendix B to the TMDL Report. If site-specific data or information differs significantly from the information and assumptions used by the State the permitting authority should account for these site-specific data in the permit conditions.

In consideration of the appropriateness of these regional wasteload allocations, U.S. EPA noted the State's intent to require mercury minimization plans and monitoring for WWTPs with an average wet weather design flow of greater than 200,000 gallons per day. U.S. EPA considers this requirement part of the State's implementation plan for the TMDLs. Although U.S. EPA is taking no action through this decision on any elements of implementation included in the State's TMDL Report, U.S. EPA did consider the State's requirement for mercury minimization plans and monitoring to be important in minimizing local impacts from point sources.

5. Load Allocations (LAs)

U.S. EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity attributed to existing and future nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 CFR §130.2(g)). Where possible, load allocations should be described separately for natural background and nonpoint sources.

The load allocation for the northeast region is 1.09 kg/day and the load allocation for the southwest region is 1.55 kg/day. These load allocations are gross allotments. The load allocation, as defined at 40 CFR §130.2(g), allows for the use of gross allotments depending on the available data and techniques for predicting the loading. The primary nonpoint source for both these TMDLs is atmospheric mercury deposition. Given that the TMDL uses a regional approach, and the State indicates in the TMDL Report that air deposition is relatively uniform across the State, a gross allotment is reasonable.

The State's discussion of load allocation assumes mercury load reductions will come from atmospheric mercury deposition; therefore, once the regional reduction factors were applied to the TSLs the State simply subtracted these load reduction goals from the TSLs to arrive at the load allocations for each region that are found in Table 8 of the TMDL Report. However, simply applying the load reduction goals to the TSLs does not consider the wasteload allocations or any margin of safety. The State used the TMDL equation, $TMDL = WLA + LA + MOS$, to establish the final load allocations that are being approved and are found in Section 9 of the TMDL Report.

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For the northeast region there is an implicit margin of safety; therefore, the TMDL equation becomes $TMDL = WLA + LA$. The TMDL for the northeast region has been established at 1.10 kg/day and the wasteload allocation established at 0.01 kg/day; therefore, the load allocation is 1.09 kg/day ($LA = TMDL - WLA$).

For the southwest region the State has applied an explicit margin of safety of 0.61 kg/day. The TMDL has been established as 2.18 kg/day and the wasteload allocation established as 0.02 kg/day; therefore, the load allocation is 1.55 kg/day ($LA = TMDL - WLA - MOS$ (explicit)).

The definition of load allocation at 40 CFR 130.2(g), states that “[w]henver possible, natural and nonpoint source loads should be distinguished.” The TMDL Report states that 30% of the atmospheric mercury deposition load is from natural sources. The State does not intend for the TMDLs to address any portion of the mercury deposition from natural sources.

Assessment: U.S. EPA finds that the load allocations are adequately specified in the TMDLs at a level sufficient, when combined with the wasteload allocations, to attain and maintain water quality standards. Section 6.4 and Tables 9 and 10 of the TMDL Report distinguish between in-state and out-of-state contributions to the load allocations, necessary load reductions from anthropogenic sources within each region, and emission reduction goals. This information, although reviewed by U.S. EPA, is not considered part of the approved load allocations. U.S. EPA considers the specifics of how the necessary reductions will be achieved to be an implementation issue, and therefore not part of the approved TMDLs.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d)(1)(C), 40 CFR §130.7(c)(1)). U.S. EPA’s 1991 TMDL Guidance explains that the margin of safety may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the margin of safety. If the margin of safety is implicit, the conservative assumptions in the analysis that account for the margin of safety must be described. If the margin of safety is explicit, the loading set aside for the margin of safety must be identified.

Northeast Region:

The State includes an implicit margin of safety for the northeast region TMDL. The implicit margin of safety comes from the impact of sulfur deposition reductions expected under the Clean Air Act; these impacts were not considered in the estimate of atmospheric mercury deposition. Sulfate deposition stimulates sulfate-reducing bacteria. Studies have shown that sulfate-reducing bacteria are responsible for the transformation of mercury into methylmercury. Section 2.1 of the TMDL Report states that “[n]early all the mercury that accumulates in fish tissue is methylmercury. Inorganic mercury, which is less efficiently absorbed and more readily eliminated from the body

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than methylmercury, does not tend to bioaccumulate.” Sulfur reductions required pursuant to the Clean Air Act and the Clean Air Interstate Rule (CAIR) will result in reductions in sulfur deposition. Reductions in sulfur deposition, through a decrease in sulfate-reducing bacteria activity, will decrease the efficiency of mercury methylation and in turn, decrease the production of methylmercury. This anticipated decrease in methylmercury was not accounted for in the development of the TMDL, thus providing an implicit margin of safety that the TMDL is established at a level designed to achieve water quality standards. The State applied this implicit margin of safety only to the northeast TMDL because sulfate-reducing bacteria thrive in wetland environments and the northeast region is dominated by wetlands.

Southwest Region:

The explicit margin of safety for the southwest TMDL is 0.61 kg/day. This margin of safety was established by applying the greater reduction factor for the northeast region to the TSL for the southwest region thereby creating a load allocation of 1.55 kg/day. The difference between the necessary load allocation for the southwest and the southwest’s load allocation calculated with the northeast’s reduction factor is 0.61 kg/day ($2.16 - 1.55 = 0.61$ kg/day). The State recognized that the target for the northeast would not yet be achieved when only the target for the southwest has been achieved, as the State assumed atmospheric reductions to be uniform across the State. The State therefore chose to apply the greater reduction factor for the northeast region across the State to ensure that the target in both regions would be achieved.

Assessment: U.S. EPA finds that the Mercury TMDLs submitted by the State of Minnesota provide an adequate margin of safety. The implicit margin of safety for the northeast TMDL comes from the impact of reduced sulfur deposition on mercury bioaccumulation and concentrations in fish tissue. These sulfur reductions were not factored into the load allocation for atmospheric deposition and is a conservative assumption in the analysis to account for uncertainty between mercury deposition and mercury concentrations in fish tissue. The explicit margin of safety for the southwest TMDL comes from the application of a greater reduction factor to the southwest’s load allocation. Since the primary nonpoint source subject to the load allocation is atmospheric deposition and since the State assumed that deposition is uniform across the State, the State’s application of the higher northeast reduction factor to both regions is a reasonable approach.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variations. (CWA §303(d)(1)(C), 40 CFR §130.7(c)(1)).

Section 8 of the TMDL Report states that seasonal variation of mercury deposition and water concentrations are not significant to these TMDLs.¹⁷ Seasonal fluctuations can occur in mercury

¹⁷ Some language in the discussion of seasonal variation in the TMDL Report might suggest that the TMDLs are expressed as annual loads. This is not the case. The public notice draft TMDLs included only annual loads however, in

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deposition, mercury methylation, and water concentrations. However, since mercury bioaccumulates over a long time period and since the resulting risks to humans are considered a long-term phenomenon, annual variations over many years are of greater significance than seasonal variations. The fish tissue mercury concentration at the time of sampling represents an integration of the variability up to the time of sampling.

Assessment: U.S. EPA finds that the Mercury TMDLs submitted by the State of Minnesota adequately accounted for seasonal variation. The daily TMDLs that are being approved were calculated from annual mercury loads and fish tissue concentrations over five years. Consideration of annual loads and concentrations over time is appropriate because mercury's bioaccumulation properties over the life of the fish are considered to outweigh the effect of seasonal variations.

8. Reasonable Assurances

When a TMDL is developed for waters impaired by point sources only, the issuance of a NPDES permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 CFR §122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with "the assumptions and requirements of any available wasteload allocation" in an approved TMDL.

When a TMDL is developed for waters impaired by both point and nonpoint sources, and the wasteload allocation is based on an assumption that nonpoint source load reductions will occur, U.S. EPA's 1991 TMDL Guidance states that the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for U.S. EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards.

U.S. EPA's August 1997 TMDL Guidance also directs Regions to work with States to achieve TMDL load allocations in waters impaired only by nonpoint sources. However, U.S. EPA cannot disapprove a TMDL for nonpoint source-only impaired waters, which do not have a demonstration of reasonable assurance that LAs will be achieved, because such a showing is not required by current regulations.

Section 12 of the TMDL Report provides discussion of reasonable assurances for both point and nonpoint sources. Within Minnesota there are many existing programs already in place that target mercury reductions. Some of these programs target mercury used in products while others regulate air sources known to emit mercury. As documented in the TMDL Report, Minnesota has seen success in achieving mercury reductions through these existing programs. Table ES-1 of the TMDL Report shows that as of 2005, there has been a 70% reduction in mercury emissions from the 1990 levels. U.S. EPA has no reason to believe that Minnesota will not continue these existing programs

light of the April 25, 2006 Decision by the U.S. Court of Appeals for the D.C. Circuit in *Friends of the Earth, Inc. v. EPA, et al.*, No. 05-5015, the State included daily loads in the TMDLs submitted to U.S. EPA for review and approval.

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and that the programs will not continue to be implemented successfully. In addition to the existing programs, U.S. EPA considered recent regulatory actions within the State and at the Federal level in the review of reasonable assurance.

Some of the existing programs, such as the health care outreach and dental office outreach, in addition to requiring mercury minimization plans can positively impact reductions in mercury entering wastewater treatment facilities, thus allowing for reductions in mercury effluent concentrations. Minnesota's regulatory program requires wastewater facilities to monitor using U.S. EPA Method 1631, ensuring the best available analysis in detecting mercury. In addition to these existing actions, the State will be proposing rulemaking where new or expanding water dischargers receive a 1 mg/L total phosphorus limit. In order to achieve this limit the State believes many facilities will need to add Bio-P¹⁸ to their process. The State has data from other Minnesota point sources that show Bio-P helps reduce mercury effluent concentrations.

Existing voluntary reduction programs and existing laws for municipal and medical waste incinerators help provide reasonable assurance for the load allocations. Mercury emission reductions have already been demonstrated in response to Minnesota's incinerator rules. In May 2006, the Minnesota Governor signed the Mercury Emissions Reduction Act. This new law requires 90 percent emission reductions from three specific coal-fired power plants in Minnesota by 2014.

The State recognizes that all the necessary reductions will not come from within the State of Minnesota. Although the State does not take responsibility for implementing these programs, the State identified national and international programs focused on mercury reductions. Taken together, the federal Clear Air Interstate Rule and Clean Air Mercury Rule will reduce electric utility mercury emissions by nearly 70 percent on a nationwide basis from the 1999 levels when fully implemented.

Assessment: U.S. EPA finds that the Mercury TMDLs submitted by the State of Minnesota provide reasonable assurances that the wasteload allocations and load allocations will be achieved.

9. Monitoring Plan to Track TMDL Effectiveness

U.S. EPA's 1991 document, Guidance for Water Quality-Based Decisions: The TMDL Process (U.S. EPA 440/4-91-001) recommends a monitoring plan to track the effectiveness of a TMDL.

The TMDL recognizes the need for monitoring and further study of factors affecting mercury contamination of fish tissue. On page 42 of the TMDL Report, the State identifies five monitoring options that will be considered by the State. The TMDL Report also identifies two areas of current study related to better understanding the impacts of local factors on mercury contamination. U.S. EPA encourages the State to include more specific discussion of future monitoring efforts in the

¹⁸ Biological phosphorus removal

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State's implementation plan for these TMDLs. If future monitoring efforts and the results of current studies provide new information that would change any assumptions used to establish these TMDLs, or which would change the allocations in these TMDLs, the State should take measures to revise the TMDLs as soon as possible or if more appropriate, develop water body specific TMDLs.

Assessment: U.S. EPA finds the Mercury TMDLs submitted by the State of Minnesota adequately describes recommendations for future monitoring to track the effectiveness of the TMDLs, although U.S. EPA is not approving any recommendations for monitoring contained in this TMDL Report or any other aspect of Minnesota's monitoring program through this decision.

10. Implementation

U.S. EPA policy¹⁹ encourages Regions to work in partnership with States/Tribes to achieve nonpoint source load allocations established for 303(d) listed waters impaired by nonpoint sources. Regions may assist States/Tribes in developing implementation plans that include reasonable assurances that nonpoint source load allocations established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. In addition, U.S. EPA policy recognizes that other relevant watershed management processes may be used in the TMDL process. U.S. EPA is not required to and does not approve TMDL implementation plans.

The TMDL Report discusses in many places the development of an implementation plan upon approval of the TMDLs. The State's discussions mention stakeholder involvement in the development of the implementation plan. U.S. EPA encourages the State to move forward in an expeditious manner with the development of such a plan. The State identified mercury minimization plans and Bio-P as possible ways to implement the wasteload allocation. As previously stated in this Decision Document, U.S. EPA considered the State's requirement for mercury minimization plans an important mechanism in minimizing local impacts from point sources. Also, the State has seen some success in reducing mercury effluent concentrations at facilities operating with Bio-P. U.S. EPA encourages the State to pursue all treatment technology options available in its plans to implement the wasteload allocations.

The State included discussion about implementation of the load allocation in many sections of the TMDL Report. Natural sources of mercury are not included in the State's implementation plans as described in Section 11 of the TMDL Report. The State has also made it clear that because of jurisdictional limitations, contributions from out-of-state nonpoint sources will not be directly addressed during implementation. The State's implementation section of the TMDL Report indicates that Minnesota participates in national and international mercury reduction initiatives. These implementation activities will have an impact on out-of-state sources. The State's implementation discussions regarding nonpoint sources included other short-term actions such as development of monitoring and reporting protocols, development of a permitting strategy for new or expanding air emission sources, continuation of current reduction strategies, and continuation of

¹⁹ Perciasepe, B., U.S. EPA, Office of Water, *New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs)*, August 8, 1997.

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current collection programs. All of these actions should have positive impacts on reducing mercury loads throughout the State.

As part of its review of the TMDLs, U.S. EPA considered the Minnesota Mercury Emissions Reduction Act of 2006, as an implementation tool for achieving the load allocations of these TMDLs. On May 11, 2006, the Governor signed this Act into law. When fully implemented, a 90% reduction in emissions from three large coal-fired power plants in Minnesota should be achieved. When implemented, this new law should have a positive impact on the State's efforts at achieving the load allocations.

Assessment: U.S. EPA is taking no action on the implementation section of the TMDL Report but notes that the State appears to have good basis for the development of a more detailed implementation plan.

11. Public Participation

U.S. EPA policy is that there should be full and meaningful public participation in the TMDL development process. The TMDL regulations require that each State/Tribe must subject calculations to establish TMDLs to public review consistent with its own continuing planning process (40 CFR §130.7(c)(1)(ii)). In guidance, U.S. EPA has explained that final TMDLs submitted to U.S. EPA for review and approval should describe the State's/Tribe's public participation process, including a summary of significant comments and the State's/Tribe's responses to those comments.

Provision of inadequate public participation may be a basis for disapproving a TMDL. If U.S. EPA determines that a State/Tribe has not provided adequate public participation, U.S. EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by U.S. EPA.

Section 13 of the TMDL Report includes a summary of the public participation process. The State also submitted a public participation package in the August 25, 2006 correspondence submitting the final TMDLs for U.S. EPA review and approval. The public participation package included copies of public comments received during the public notice and comment period, a summary of public comments received and the issues raised in these public comments, MPCA's responses to the issues raised in public comments, and dates and descriptions of public participation opportunities along with supporting documentation.

The draft TMDLs were on public notice from July 18 to October 18, 2005. The State held eight public information meetings throughout the State between July 14 and July 25, 2005. More than 900 comments were received. MPCA received comments by letter, electronic mail and postcard. The National Wildlife Federation filed a contested case petition during the public notice and comment period. On January 18, 2006, National Wildlife Federation withdrew its petition for a contested case hearing. After consideration of public comments received, MPCA made available

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through its website a revised TMDL Report dated June 1, 2006. Additionally, MPCA made available a summary of the public comments received and the State's responses. On July 25, 2006, MPCA requested approval from the MPCA Citizens' Board to submit the revised TMDLs to U.S. EPA for review and approval. The MPCA Citizens' Board concurred unanimously that the revised TMDLs be submitted to U.S. EPA. Three organizations, Minnesota Center for Environmental Advocacy (MCEA), Indigenous Women's Mercury Investigation, and Minnesota Power, and one individual provided written comments to the Citizens' Board. On July 26, 2006, MPCA submitted a copy of these four written comments to U.S. EPA. The State did not provide a response to these four comments since they were not submitted during the formal public notice and comment period. On August 25, 2006, MPCA submitted the final TMDLs to U.S. EPA for review and approval. On August 28, 2006, MPCA submitted to U.S. EPA a copy of the transcript from the July 25th Citizens' Board meeting.

Assessment: In reviewing the TMDLs, U.S. EPA reviewed the public participation package submitted by the State in the August 25th correspondence. U.S. EPA reviewed the public comments, the State's summary of the issues raised in public comments, and the State's responses and has determined that the State's summary and responses reasonably reflect the issues included in the 900 plus public comments. In reviewing the TMDLs, U.S. EPA also reviewed the transcript from the July 25th Citizens' Board meeting and the four comment letters submitted to the Citizens' Board. U.S. EPA finds that the State of Minnesota's public participation process satisfies the requirement that calculations to establish TMDLs shall be subject to public review in accordance with State procedures thus satisfying the requirement at 40 CFR §130.7(c)(1)(ii).

12. Submittal Letter

A submittal letter should be included with the TMDL, and should specify whether the TMDL is being submitted for a technical review or final review and approval. Each final TMDL submitted to U.S. EPA should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for U.S. EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and U.S. EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final review and approval, should contain such identifying information as the name and location of the water body, and the pollutant(s) of concern.

Assessment: MPCA's August 25, 2006 correspondence signed by Brad Moore, Acting Commissioner, addressed to Jo Lynn Traub, Director, U.S. EPA, Region 5, Water Division, states that the final draft Mercury TMDL Report and the public participation package are submitted under Section 303(d) of the Clean Water Act for U.S. EPA review and approval.